

# THE INFORMATION REVOLUTION

PLANNING FOR | INSTITUTIONAL CHANGE



## THE NPS INFORMATION TECHNOLOGY STRATEGIC PLAN

NAVAL POSTGRADUATE SCHOOL | FY 2003

NAVAL POSTGRADUATE SCHOOL INFORMATION TECHNOLOGY





INTRODUCTION .....	4
NETWORK INFRASTRUCTURE	
Physical Infrastructure .....	7
Internet Access.....	7
Wireless Networking.....	8
Remote Access .....	9
Navy and Marine Corps Intranet .....	9
Internet2 and Technological Innovation.....	10
Availability of Services.....	11
ACADEMIC APPLICATIONS AND SERVICES	
Classrooms .....	12
Distance Learning.....	12
IT Services to Support Instruction .....	13
IT Services to Support Research .....	14
IT Infrastructure to Support Research .....	14
ADMINISTRATIVE APPLICATIONS AND SERVICES	
Envisioning Change.....	15
Defining What is Needed. ....	15
Moving to an Integrated Systems Environment.....	16
Defining the NPS Portal.....	17
IT MANAGEMENT AND RESOURCES	
Management and Governance.....	19
Human Resources.....	20
Customer Focus.....	21
IT Resource Requirements .....	22
MODEL 1: Status Quo.....	22
MODEL 2: Beginning the Transformation .....	23
MODEL 3: Accelerating the Transformation .....	24
COMMUNICATION, PARTNERSHIP, AND OUTREACH	
Communication.....	26
Partnership and Outreach .....	27
CONCLUSION .....	28

# INTRODUCTION

## NPS MISSION

PROVIDE RELEVANT  
AND UNIQUE  
ADVANCED  
EDUCATION AND  
RESEARCH  
PROGRAMS IN ORDER  
TO INCREASE THE  
COMBAT  
EFFECTIVENESS OF  
U.S. AND ALLIED  
ARMED FORCES AND  
ENHANCE THE  
SECURITY OF THE  
UNITED STATES.

## IT AS MISSION CRITICAL

The Joint Vision of NPS outlines the future goals for the institution within the context of national priorities and defines academic goals through excellence in scholarly accomplishment and peer recognition. It requires that our faculty and staff are experienced in using modern technologies for teaching and learning. We must nurture and sustain efforts in high performance computing, multi-media technology, educational technology, and the technology of distance education.

The NPS mission underscores the importance of advanced education and research to the future security of the U.S. and the world. Advanced education and research in the 21st century is rooted in and enhanced by Information Technology (IT) as an enabling tool for scientific discovery, learning, and communication.

Never has the university had a greater opportunity to fulfill its mission of education, research and service to the Department of Defense. The NPS Strategic Plan defines a number of issues that will drive change nationally and that will affect NPS directly. One of the five “guiding principles” in the plan focuses on the need to “invest in technology to fulfill our mission.” Finally, the NPS Strategic Plan identifies Information and Technological Superiority as one of the six institutional priority areas, although IT is also clearly represented in the other five priority areas.

The recent NPS self-study report to the Western Association of Schools and Colleges reflects an overall commitment to improvement and innovation. One of the most salient themes within the report refers to computing and information services:

*A first class communications network is an essential part of the IT infrastructure required to achieve preeminence ... None of our forward-looking plans would be possible without reliable and high-performance communication links within the campus and with external sites.*

Defining IT as a strategic resource and as mission critical is appropriate. The use of IT is ubiquitous in everyday life in the U.S. The latest report from the National Telecommunications and Information Administration, [A Nation Online: How Americans are Expanding their Use of the Internet \(February, 2002\)](#), shows that the “growth of Internet use in the U.S. is currently two million new Internet users per month.” More than 50 percent of Americans are now online. Ninety percent of children between the ages of 5 and 17 now use computers. Residential use of broadband service more than doubled (from 11 to 20 percent of Internet

users) from 2000 to 2001. As a result, the report concludes that the U.S. is “truly a nation online.”

Research universities, in partnership with the Department of Defense, have led the development and use of computing and advanced networks from the beginning. Recognized as a vital enabling strategy, universities have wired and wireless campuses, seeing access to this valuable technology as important to research, instruction, and service; the three cornerstones of a research university mission.

Information Technology is now used in classrooms to enhance the learning experience in the finest universities in the U.S. Faculty members enrich lectures with examples that students can experience in ways never before possible. The experience of virtual experimentation is available to students where previously certain experiments were too expensive or too dangerous to duplicate or to allow students to perform at all. Collaboration with colleagues at other institutions has been made easier and more effective with video-conferencing. Development of both online and video-conferencing based educational courses and resources has given access to students who otherwise could not attend residential campus environments. In the case of the military, providing education and training opportunities to military personnel stationed at remote locations is often essential to their effectiveness in performing their given missions.

### IT AS COMPETITIVE NECESSITY

Defining IT as a mission critical strategic resource is appropriate, especially at the Naval Postgraduate School. As our colleagues at UCLA have said in their Information Strategic Plan, “Successful planning, implementation and innovation of IT has become a competitive necessity for higher education (2001).” Every goal and strategy defined in the NPS Strategic Plan is dependent either directly or indirectly on IT. Our students are already IT aware when they begin their studies, and they expect their expertise to increase significantly as a result of their education here. Our faculty members are hired from the best universities in the world and arrive at NPS with research and educational programs that require advanced networking infrastructure, sophisticated user support, and access to high performance computing. Our administrative systems are linked with the Department of Navy systems, which are increasingly upgraded to more efficient system architectures and performance standards.

In order to provide the kind of environment that supports our current academic mission and vision, we must plan collaboratively and mark our progress carefully. The IT Task Force was formed at the beginning of

“SUCCESSFUL  
PLANNING,  
IMPLEMENTATION  
AND INNOVATION  
OF IT HAS BECOME  
A COMPETITIVE  
NECESSITY FOR  
HIGHER  
EDUCATION.”

2001 STRATEGIC PLAN  
UNIVERSITY OF  
CALIFORNIA,  
LOS ANGELES

## INTRODUCTION

last year by the Superintendent and Provost to develop an IT Strategic Plan that supports the NPS Strategic Plan. The goals of the IT Strategic Plan are:

- Improve technological support for the core mission of teaching and research;
- Improve the educational experience of students by incorporating technology into instruction, where appropriate;
- Improve communication about IT as a strategic NPS priority.

After defining the above goals, the IT Task Force posed this question to focus our overall strategy: “What are the factors or areas of IT that are so critical to our success that failure to accomplish any one of them puts our other goals at risk?”

After substantial discussion and consultation with several sectors of the university community, the IT Task Force outlined five elements necessary for successful achievement of the above goals. It is appropriately these five elements that constitute the core areas of the strategic plan:

1. Network Infrastructure Issues: Campus intranet, data and network security, world wide remote access, internet accessibility, and connectivity to other high-speed networks (e.g. Internet2, the University of California system backbone). Also included are issues relating to supercomputing access and support. Information network extends beyond the traditional concept of simple connections between computers to include the applications, data repositories, and interoperability with the Navy Marine Corps Intranet and other allied networks, along with the required system support, and other hardware and software that allow faculty, staff and students to access and backup the information, applications, or services they need.

2. Academic Applications and Services: IT services provided, equipment acquisition, maintenance and replacement, software license acquisition, maintenance and upgrades, and customer support. Includes support of instructional technology in local and remote settings.

3. Administrative Applications and Services: Current status, review of future options (near-term and longer view), compatibility with other institutions, customer support, and compatibility with other Navy requirements.

4. Management and Resources: Management, resources, security, planning, professional development, user training and orientation.

5. Communication, Partnerships, and Outreach: Including internal communications and external visibility.

## PHYSICAL INFRASTRUCTURE

The NPS network infrastructure must be updated. The current backbone of the NPS network, installed a few years ago, is built using 3Com ATM switches. 3Com has abandoned the ATM market. Replacement parts for 3Com ATM equipment are difficult to find and soon will be impossible to find. The longer NPS depends on this unsupported 3Com equipment, the greater the exposure to an extended service interruption while searching for 3Com spare parts. In addition, plans must be formulated based upon regular monitoring of network usage, traffic patterns, and projection models of future demand. Issues of speed, responsiveness, reliability, and capacity must all be considered. Redundancy is required for maximum reliability and network efficiency.

The backbone switch centers of the NPS network (Ingersoll, Spanagel, and Herrmann) require replacement with current enterprise level technology (gigabit Ethernet). The ATM backbone technology installed a few years ago is no longer supported. Portions of the existing architecture are scheduled for replacement this year to improve performance and slightly reduce out-year replacement costs.

### Recommendations

1. Up-to-date maps of network infrastructure conduits (voice, video, and data) will be maintained by Public Works. The logical network diagrams will be maintained by the Network Operations Center (NOC). All plans for renovation or construction will include consultation with the NOC to ensure IT requirements are included in the planning cycle.
2. NPS will replace its in-ground conduit and fiber plant. The replaced fiber will last approximately 20 years (one-time cost).
3. The network backbone will be upgraded to replace ATM technology with gigabit Ethernet (one-time costs), and network architecture will be changed so that every major building will have connections with two other buildings on campus.

## INTERNET ACCESS

NPS connectivity to the rest of the world needs to be planned as well. Whereas the Defense Research and Engineering Network (DREN) provides adequate service for DoD connectivity, it does suffer slowdowns and inefficiencies in connectivity to the commercial internet that create problems for the NPS mission. It is clear that expanded capacity and speed are an immediate strategic priority.

As NPS expands its role in Internet2, the primary connection to this architecture will require the equivalent of OC-48 (2.5 Gbps speed - this is the speed of the University of California backbone). Even more important than speed is redundancy. NPS needs parallel router connections with the outside world. Both routers should connect to an Internet Service Provider (ISP-PacBell Internet, for example) and DREN. By implementing this change, speed and capacity would be increased, as would reliability of access to the outside world.

Firewalls control access and provide security to the environments in which they are installed. By their very nature, they provide a barrier that makes



## NETWORK INFRASTRUCTURE

### THE BENEFITS OF MOBILE, UNTETHERED NETWORK CONNECTIVITY PROMISES SOME OF THE SAME ADVANTAGES FOR E-MAIL AND OTHER APPLICATIONS THAT THE CELL PHONE DID FOR TELEPHONE SERVICE.

access more difficult but provides a level of assurance to the network. In a university environment this can be a particularly difficult situation. While the underlying principle of academic instruction and research is collaboration, peer review and the ability to replicate findings, firewalls place limitations on these activities. The NPS firewall is a mandated necessity because the network is in a dot mil (.mil) domain. The educational institution domain designation called dot edu (.edu) provides less restrictions than the .mil domain and may address some of the access problems encountered at NPS.

As a result, NPS will move to operationalize the .edu designation for NPS. Connecting with the University of California system backbone would ensure access to current network technology over the long term. Appropriate network speed and capacity for a research university such as NPS would be assured. The .edu designation would be available in addition to the existing .mil designation, which would continue and provide for future connection to the Navy Marine Corps Intranet (NMCI).

#### Recommendation

4. Connection to the internet should be expanded to multiple routers, accessing, minimally, DREN and a commercial ISP. This would permit use of the .edu designation as well as continuing with the required .mil utilizing the 802.1x VPN technology implemented within the network fabric.

## WIRELESS NETWORKING

Wireless network technologies and standards are becoming available and will play an important role in complementing the existing and future networks at NPS. The benefits of mobile, untethered network connectivity promises some of the same advantages for e-mail and other applications that the cell phone did for telephone service.

Wireless networks also have the potential to dramatically increase the number of network connections. There is a growing need to provide network connectivity not only to every classroom, but to every seat in the classroom. Just as information technology is used to facilitate business processes and decision-making throughout all branches and levels of organizations, it is also being used to facilitate the instruction of many different academic courses throughout universities. NPS must participate actively in this substantive change and provide an educational experience that makes effective use of wireless capabilities. Wireless technology has helped to advance the information revolution in that universities are seeing a pedagogical shift from using information technology in limited courses to using IT in virtually all courses. Wireless networking is not considered to be a replacement for a well-wired campus with wired access speeds continuing to stay significantly faster than wireless technologies. As applications that require higher bandwidth become commonplace, wireless network technology may not be able to provide a suitable network connection.

Thus, wireless should be seen as an augmentation to the physical wire plant, extending the network for general-purpose network access into zones of transient use (such as common areas), and enabling applications that require the mobility offered by wireless but do not require the bandwidth or reliability of wired connections.

Wireless networking is the most cost effective and operationally



augmentation-responsive technology available today and is in keeping with the strategic vision of every major university in America.

#### Recommendation

5. Institutionalize and continue expansion of the existing wireless capability at NPS.

### REMOTE ACCESS

In addition, issues surrounding remote access must be considered within any discussion of network infrastructure. Remote access can be defined as the ability to use the resources of the NPS campus network from a site other than the campus proper. This applies to the student housing areas at La Mesa and the Ord Military Community, distance learning environments including ships and shore stations worldwide and for faculty and students while traveling. This may include expansion of the network to include the local housing areas, addition of wireless access points, high speed dial-in access or access through commercial internet service providers.

In order to ensure that the network remains secure while still providing for unfettered remote access, a comprehensive program of network monitoring and reporting must be in place.

#### Recommendations

6. Access to the NPS network must be expanded to ensure that the local student housing areas as well as remote sites supporting distance learning and travel are supported.
7. Monitoring of remote access capability will be reported on the intranet web site.

### NAVY AND MARINE CORPS INTRANET

The Navy and Marine Corps Intranet (NMCI) is a program underway in the Department of the Navy to provide networked services into a single entity. The program is designed to present an efficient model of services and access enterprise-wide. NMCI will serve as a single network across all of the Navy's shore-based sites. The program has been outsourced to EDS Corporation. Designed as a way of streamlining the number of applications used and supported, the challenges in implementation lie in legacy application integration, security, and remote access capability.

NPS is currently enrolled in NMCI with several hundred seats, largely in administrative areas. The program is scheduled to be operational at NPS in October, 2003.

In May 2002, NPS requested a site visit by NMCI officials to explore the program's viability for a research university environment. Two NMCI administrators and two EDS staff visited the campus and met with faculty and administrators. The team concluded that the research and education environment was not a likely candidate for NMCI application for two reasons:

- (1) The academic environment is based on experimentation, testing, and development of new operating systems, software, and middleware. This

## NETWORK INFRASTRUCTURE

IN ORDER TO ENSURE  
THAT THE NETWORK  
REMAINS SECURE  
WHILE STILL  
PROVIDING FOR  
UNFETTERED  
REMOTE ACCESS, A  
COMPREHENSIVE  
PROGRAM OF  
NETWORK  
MONITORING AND  
REPORTING MUST  
BE IN PLACE.

## NETWORK INFRASTRUCTURE

NPS HAS  
ADMINISTRATIVE  
SYSTEMS TO SUPPORT  
THE ACADEMIC  
MISSION THAT ARE  
NOT DUPLICATED  
ELSEWHERE IN THE  
NAVY, AND  
INCORPORATION OF  
THOSE SYSTEMS MUST  
BE ASSURED BEFORE  
NMCI ENROLLMENT  
CAN BE  
CONTRACTED.

requires putting things on the university network that would violate NMCI integrity; and,

(2) academic work is fundamentally based on peer review and collaborative work. As a result, NPS faculty and students engage in research projects with other universities, research centers and laboratories and access databases and research sources that would undermine NMCI standards.

The visit yielded intriguing possibilities for the NPS staff using administrative systems, however. The decision was made to initiate a six-month engineering study, conducted by a joint NMCI and NPS team. The study will examine how many NMCI seats will truly be appropriate at NPS, at what level of enrollment, and at what cost. The initial estimate is for 400 seats in the FY04 and FY05 timeframe.

NMCI offers an interesting opportunity to benefit from the Navy's streamlining of its reliance on legacy administrative applications. However, the NMCI program must be rigorously evaluated. NPS has administrative systems to support the academic mission that are not duplicated elsewhere in the Navy, and incorporation of those systems (e.g. student systems and research administration systems) must be assured before enrollment can be contracted. The engineering study will address these and other issues important to making the best recommendation to NPS leadership.

### Recommendations

8. A six-month engineering study will be conducted by a team of NMCI and NPS IT staff to determine appropriate numbers and levels of NMCI enrollment for administrative staff at NPS. The report will be used by the NPS NMCI Performance Evaluation Team to provide a formal recommendation about NMCI expansion at NPS.

9. A team of NPS faculty, staff and students (NPS NMCI Performance Evaluation Team) will be designated by the Provost to review and performance test NMCI capabilities for a period of six months.

## INTERNET2 AND TECHNOLOGICAL INNOVATION

Recent application for membership in Internet2 has brought with it a great deal of excitement on campus. Faculty and students are eager to be part of this state-of-the-art network with colleagues at other research universities and federal agencies. Being part of the group that will be inventing the future Internet is an exhilarating prospect and provides important momentum to NPS IT development, and it will be important to keep this momentum strong into the future. Internet2 membership represents an institutional commitment to have faculty involved in the development of internet technology and IT staff involved in the development of IT and internet-related policies.

### Recommendation

10. Assign central IT operations with responsibility for Internet2 membership support.

Equally important, central IT should be involved in developing, testing, and experimenting with a wide variety of technological products and processes.

NPS excellence is tied inextricably to its intellectual vitality. The IT division must support that vitality by supporting emerging technologies and expressing willingness to pilot new technologies with faculty members. IT excellence is based on change, innovation, experimentation, and imagination. The central IT division in a research university should provide leadership in the testing and demonstration of emerging technologies. A few examples of emerging technologies include: wireless environments, video streaming, security assessments, quality of service, high performance computing research and education, and voice over I/P (internet protocol).

#### Recommendation

11. Central IT services at the Naval Postgraduate School will be integrally involved in testing and evaluating emerging technologies.

Since video is an essential dimension of electronic communications and features prominently in a number of core mission areas for the university, it should be included in planning for IT network infrastructure.

#### Recommendation

12. Video will be included as an important component of network infrastructure and IT service planning.

Security and privacy of data and the network are conventional areas of responsibility for a central IT department. Regular security audits are included in those responsibilities and university leadership are apprised of audit outcomes.

#### Recommendations

13. IT security policies and procedures must be evaluated on an ongoing basis to keep pace with new technologies, new methods of penetrating existing systems, innovative safeguards, etc. The results of those evaluations will be reported in the IT annual report.
14. Conduct security audits on a regular basis.
15. Identify a crisis response team to address possible technology-based attacks.

## AVAILABILITY OF SERVICES

Information and systems required by NPS staff, faculty, students and other customers will be made available to those users wherever they may be located, and whenever such access is needed. The current backup systems installed on the campus are no longer adequate to backup the volume of critical research and administration data stored on the central servers and client workstations.

#### Recommendation

16. Develop a central plan for systems and data redundancy and backup.

## NETWORK INFRASTRUCTURE

IT EXCELLENCE IS  
BASED ON CHANGE,  
INNOVATION,  
EXPERIMENTATION,  
AND IMAGINATION.  
THE CENTRAL IT  
DIVISION IN  
A RESEARCH  
UNIVERSITY  
SHOULD PROVIDE  
LEADERSHIP IN  
THE TESTING AND  
DEMONSTRATION OF  
EMERGING  
TECHNOLOGIES.

## ACADEMIC APPLICATIONS AND SERVICES

IT support for the academic enterprise in a research university environment is challenging. Faculty and students are constantly using and developing new technologies. Keeping up with academic needs is daunting and yet absolutely essential.

Support for selected equipment and software is part of any central IT department's work. Equally important is providing current technical expertise and an IT culture of continuous learning and skills development. Help to meet this challenge is available in various forms from a variety of sources. Research universities around the U.S. have developed multi-tiered models of staff support for faculty and students. National organizations have developed certification programs, skills training and development courses and programs. And, sensitive to the important issue of cost control in an area of continuous customer need, industry vendors have negotiated with higher education for reduced costs with multiple site licenses.

### CLASSROOMS

Providing quality educational programs represents the core mission of NPS. Quality educational experiences at the graduate and professional level require access to technology tools, electronic information resources, high-bandwidth applications, and a variety of research and instructional applications.

To date, classroom and technology upgrades have been done on an ad hoc basis, as resources permitted and priorities indicated. Classroom technology upgrades were not part of a university-wide planning process.

It became evident that the institution needed a systematic process of classroom technology renewal. Classrooms must have the technology required by curriculum and faculty and students, and that technology must be maintained and updated at regular intervals. In addition, classroom technology issues must be integrated within a larger Information Technology planning process to insure technical interoperability and compatibility, and to leverage resources to maximize efficiencies.

#### Recommendations

17. The FY2000-2007 Laboratories, Library, LAN and Classrooms Funding Plan should be accelerated. This planning process has been successful in providing a systematic way of acquisition, maintenance, and replacement of IT-related equipment. With a modest increase in funds, a larger number of classrooms could be equipped with network access and multimedia capabilities.

### DISTANCE LEARNING

NPS Schools and Departments have embarked on a path that will lead to greatly expanded outreach to students who will not have the opportunity to spend lengthy periods of time in residence at NPS. Key to this endeavor is the establishment of, and on-going support for, a robust Distributed Learning Program. Web technology now has the capability to provide learners with a variety of virtual learning environments and functionality, with more choices/options for obtaining relevant information and knowledge. When

combined with traditional delivery methods, it holds the promise of reducing seat time at both resident and satellite sites. The long-term objective is to shorten residency requirements, accommodate changing demographics and make critical/relevant Graduate Education readily available to Naval Forces worldwide, and have every Naval officer obtain a graduate degree, that is relevant to DoN needs, before reaching the 06 promotion point.

#### Recommendations

18. NPS should invest in systems and processes that enable delivery of classes to off-campus students.

19. Distance Learning students will have access to the same services as resident students.

### IT SERVICES TO SUPPORT INSTRUCTION

IT support for the academic enterprise in a research university environment is challenging. Faculty and students are constantly using and developing new technologies. Keeping up with academic needs is daunting and yet absolutely essential.

Support for selected equipment and software is part of any central IT department's work, but providing technical expertise and opportunities for ongoing skills development and training are equally as important, if not more so. Research universities around the U.S. have developed multi-tiered models of staff support for faculty and students. National organizations have developed certification programs, skills training and development courses and programs. And, sensitive to the important issue of cost control in an area of continuous customer need, industry vendors have negotiated with higher education for reduced costs with multiple site licenses.

#### Recommendations

20. Increase the number of IT staff to support instruction. IT staff should be available to ensure that equipment is in working order for lecture and laboratory times. According to peer institutions, NPS should have one technician to maintain and help support every five interactive classrooms. An audio-video engineer should be available on an on-call basis for particularly complex problems that might arise.

21. Establish IT "design teams" to work with faculty in the development of IT-based materials for instruction. At NPS, staff members from the DLRC work as members of design teams to identify resources on the Web that might be appropriate for faculty to incorporate into courses. The faculty training offered via DLRC courses will continue to offer assistance in placing material on the Web. The design teams can also assist faculty in dealing with copyright issues and provide guidance on how to operationalize a faculty member's vision for a course (using original design, available software, and resources that include images or materials from archives). In the future, searchable archives of DoD and government owned learning objects (Sharable Content Objects) will form the building blocks of new courseware.

### ACADEMIC APPLICATIONS AND SERVICES

SUPPORT FOR  
SELECTED  
EQUIPMENT AND  
SOFTWARE IS PART  
OF ANY CENTRAL IT  
DEPARTMENT'S  
WORK, BUT  
PROVIDING  
TECHNICAL  
EXPERTISE AND  
OPPORTUNITIES FOR  
ONGOING SKILLS  
DEVELOPMENT AND  
TRAINING ARE  
EQUALLY AS  
IMPORTANT, IF  
NOT MORE SO.

22. A clearinghouse for instructional IT materials and methods is being developed, including an ongoing series of brown bag lunches in which faculty, students, and staff share their findings about instructional technologies. This is an area in which the NPS Library has provided a key partnership with the Office of Continuous Learning.

23. Partner with the Library and Office of Continuous Learning to develop data-rich portals, interactive websites, data delivery systems.

## IT SERVICES TO SUPPORT RESEARCH

Two tiers of IT support are required for research at NPS: (1) a common level of support campus-wide that includes a highly professionalized IT staff that provide information and service about information and communications technology and (2) highly specialized, high-end applications support for research computing.

### Recommendations

24. Increase the number of IT staff to support research.

25. Provide the following expertise and knowledge to support faculty research about information technology:

- Advanced computation (e.g. computer modeling and simulation, high-performance computing, wireless systems, distributed processing).
- Data visualization, mining, management, storage and retrieval.
- Data and network security.

## IT INFRASTRUCTURE TO SUPPORT RESEARCH

Infrastructure must be planned and coordinated in such a way as to provide a reliable and responsive university-wide network for instruction and administrative purposes, but also to provide high-speed network access to support research computing.

Exploration of partnerships with other institutions and consortia can further expand the reach of the NPS network. Membership in Internet2 is an example. Joining the CalRen2, the University of California network reaching from UC Berkeley to UC San Diego is another example. Participating in Monterey Peninsula I-Net, a local consortium of organizations, schools, and higher education institutions is yet another example.

Finally, NPS faculty collaborate with various Navy sponsors and with graduates. One of NPS strategic goals includes NPS in the top 50 research universities in the country by the year 2020. Providing state of the art collaboration technology is essential to this goal.

### Recommendations

26. Provide planning and coordination in support of the academic, research and administration network requirements.

27. Provide leadership in partnering with other institutions and consortia to further expand the reach of the NPS network.

28. Provide a vehicle for collaboration with our graduates.



## ENVISIONING CHANGE

Administrative systems provide electronic ways to perform the day-to-day business activities of a university. NPS is in a somewhat unique situation, relative to other universities, since many of its administrative requirements are mandated by the Department of Defense. Meeting the requirements of larger government systems while providing optimal service to our local constituencies is a challenge. The first step in addressing that challenge is to define the environment we would like to see at NPS:

- A collaborative environment where faculty, students and staff have ready access to the information and tools necessary to do their job efficiently and effectively.
- A university portal with web-enabled services and applications that support faculty, students and staff in work supporting the university mission of education, research and service to the Department of Defense.
- A workplace that is committed to the highest level of customer service and quality of work.
- A presence on the Navy Enterprise Portal for library services and distributed learning.

## DEFINING WHAT IS NEEDED

Today's NPS web environment is a disparate collection of school, departmental and research web sites. These web sites provide static web pages with infrequent updates and content maintenance. Navigating the current web environment can be difficult and time-consuming.

Today's NPS business applications and databases are stand-alone legacy systems. These applications require multiple logins and duplicate data entry. The databases are not integrated nor do they comply with emerging DoD XML standards. In some cases this has led to data redundancy and a lack of confidence in data reliability.

Several options were reviewed: Enterprise Resource Planning (ERP) systems, database architecture systems, web-based systems, and user-interface-based systems. Systems at other universities were considered: Naval Academy, NAV-AIR, SPAWAR, UC San Diego, Baylor University, Cal Tech, Claremont Graduate University, and UC Santa Cruz. From those reviews, a number of conclusions were reached about how to move from the current environment to the NPS vision.

There is a need for a new information architecture that goes beyond the functions of the current NPS Intranet. Consolidating the disparate applications and information at NPS enables a new operating environment where faculty, staff and students have the information and tools necessary to support implementation of the Functionality Assessment Team (FAT) recommendations, handle the increase in the number of resident and distance learning students, and generally perform the daily business functions of the university in a more efficient and effective manner.

NPS must put in place a new web-based information architecture that will leverage innovative technology to provide a robust, self-service working environment to our constituents.

## ADMINISTRATIVE APPLICATIONS AND SERVICES

NPS IS IN A  
SOMEWHAT UNIQUE  
SITUATION, RELATIVE  
TO OTHER  
UNIVERSITIES, SINCE  
MANY OF ITS  
ADMINISTRATIVE  
REQUIREMENTS ARE  
MANDATED BY THE  
DEPARTMENT OF  
DEFENSE.

A recent report summarized administrative systems in use at NPS (KPMG Consulting LLC, 2002):

Standard Accounting and Reporting System (STARS). This is a DoD mandated, interactive real-time accounting system used for processing and reporting of funds.

Funds Administration and Standardized Document Automation (FAST-DATA). This is a Navy mandated legacy system that will eventually be replaced.

Travel Manager. This is a web-based system designed to facilitate travel arrangements, interfacing with SATO and FASTDATA. This is a Navy legacy system.

ANSERS. A contracting system. It is a Navy legacy system.

PARIS/XP. This is a purchase card reconciliation system. NPS is the only Navy shore activity using PARIS.

Departmental Online Reporting System (DORS). This is an NPS developed system used to provide a consolidated view of labor, travel and purchases and account balances for both reimbursable and direct funded activities/departments. It is a data mart/warehouse retrieving data from ETAC et.al.

Electronic Time and Attendance Certification (ETAC). This is an NPS developed system used to certify CIVPERS payroll and allocate an individual's labor hours by JONs. Uploading labor from ETAC into STARS is done manually.

Defense Civilian Pay System (DCPS). This is the standard DoD civilian pay system.

Standard Labor Data Collection and Distribution Application (SLDCADA). This is a NAVSEA developed system selected as the DoN standard. It provides inputs into DCPS which feeds STARS.

Defense Property Accountability System (DPAS). A Navy mandated system. DPAS is used for property inventory, property accountability, property valuation, equipment utilization and preventive maintenance scheduling.

Product Yet To Have An Official Name (PYTHON). This is an NPS-developed and maintained administrative system containing student, staff and faculty information.

## MOVING TO AN INTEGRATED SYSTEMS ENVIRONMENT

The development of a new information architecture requires adherence to the Department of Defense guiding principles for administrative systems: quality, timely customer services; integrated, standard systems that comply with applicable accounting principles and internal controls; robustness based

on efficient, standard, shared information systems; reliable, flexible, scalable, interoperable and secure operations; recognition of the DFAS corporate data environment; standards-based architecture; stewardship accountability; single entry of data; user-friendly interfaces; module reusability; rapid technology update capability and; compliance with laws and regulations.

NPS has further elaborated the above principles:

- Organized structured and unstructured information – Information will be logically organized and categorized based on user needs and habits. Information can be structured (i.e. Course Catalog) or unstructured (i.e. Threaded Discussion) and will be captured in a centralized document repository for search and archive.
- Current and relevant content – Content will be fresh and relevant to the user based on the user's job description, work habits and life interests.
- Data in a context that is meaningful to the user – data will be delivered to the user using web interfaces based on the job description and need.
- User-friendly navigation – logical flow based on established standards of usability and accessibility, including the use of content analysis and a content map.
- Back-end data integration – Seamless integration across all university assets and resources pointing to authoritative data sources.
- Single sign on (SSO) is defined as a capability providing authenticated access to multiple web-enabled resources using a single password. This approach also implies a single or unified security administration mechanism, and the associated development and operational cost and resource savings.

## DEFINING THE NPS PORTAL

An NPS Portal is central to the new information architecture. The Portal's web browser interface will serve as the entry point for faculty, students, and staff to access information, tools and training particular to their roles and work habits.

The NPS Portal will serve as an integration mechanism that aggregates applications, content, and data. It will connect us with everything we need and with everyone we need. The NPS Portal will support many internal sub portals based on business unit, role and individual. The initial enclaves of sub portals will be:

- Business to Faculty and Staff Portal (Employee) - Provide targeted information and tools to all members of NPS Faculty and Staff based on role within the organization. Provide discovery mechanism to help members select the components that they want.
- Business to Student Portal (Student Services) - Provide targeted

## ADMINISTRATIVE APPLICATIONS AND SERVICES

THE NPS PORTAL  
WILL SERVE AS AN  
INTEGRATION  
MECHANISM THAT  
AGGREGATES  
APPLICATIONS,  
CONTENT, AND DATA.  
IT WILL CONNECT US  
WITH EVERYTHING  
WE NEED AND WITH  
EVERYONE WE NEED.

## ADMINISTRATIVE APPLICATIONS AND SERVICES

### THREE MAJOR ELEMENTS MUST BE INVOLVED IN THE ADMINISTRATIVE APPLICATION TRANSFORMATION:

1. PROCESSES AND POLICIES
2. PEOPLE
3. TECHNOLOGY

information, applications and services applicable to all students. Provide discovery mechanism to help members select the components that they want.

- Business to Recruit Portal (New Student, Faculty, Staff) – Provide targeted information applicable to potential faculty, students and staff as a recruiting mechanism.
- Business to Department Portal (Financial Systems) – Provide an “ERP like” business portal to make current and relevant financial information readily available to managers across the university.
- Knowledge Portal – Provide knowledge capture and transfer of the expertise between NPS staff, faculty and students.

Three major elements must be involved in the administrative application transformation:

A. Processes and Policies – NPS is beginning a business process and procedure redesign effort to improve performance of administrative processes. We can use this opportunity to integrate these processes into the information architecture. Over the next decade the NPS staff will fundamentally change the way they perform their work. The process improvement and web integration efforts are key to the transition to an information-based work environment, where staff can easily find the information they need to do their jobs.

B. People – The effectiveness of the new information architecture lies in the acculturation of the NPS workforce. It also lies in the workforce’s baseline technical, interpersonal and managerial competencies. To successfully employ the web architecture we must recognize that the interactions between our people on a day-to-day basis are an important determinant of the success of our organization. We must recognize the need for appropriate investment of staff resources to design and implement the new web architecture.

C. Technology – Technology should be used to move manual administrative work online. It is time to web-enable NPS campus services and applications. As an example, PYTHON allows students to routinely access grades, schedules and other student information via the Internet. This model can be used throughout the organization to provide similar functionality, content and information to faculty and staff.

#### Recommendations

29. Prioritize administrative applications with regard to content, services and applications for a phased web implementation.

30. Web-enable business applications with back-end integration. Ensure that user interfaces are intuitive and easily navigable.

31. Develop a portal model that migrates from static web pages to a database-driven environment.

32. Develop a prototype corporate portal template, based on best practices in industry and higher education.

## MANAGEMENT AND GOVERNANCE

In order to fulfill its role as a mission critical resource, IT must offer service at the highest level of excellence. To do so, the IT division should be managed with the highest degree of accountability and responsiveness to institutional goals.

Several changes in IT structure and process should be considered. It should be noted that a few of the suggestions listed below have been implemented or are being implemented. They are included on the list as they are important elements of a larger strategy to generate and sustain the momentum for change.

### Recommendations

33. Institute management practices that include: an updated organizational chart with clear reporting responsibilities; updated position titles and descriptions; communications plan; routine and documented budget process; central compilation of all IT-related policies; publication that describes services.
34. Establish an IT planning process to centrally control acquisition and life cycle maintenance of hardware and software.
35. Centrally coordinate software licensing in IT to exploit economies of scale. Publish available software inventory on Intranet.
36. Feature IT prominently in macro-level planning initiatives, having IT serve as an integrator of area plans and as an institutional priority in the university-wide plan.
37. Include IT leadership at the highest-level institutional meetings.
38. Develop an IT strategic plan that supports the larger academic plan of the institution and other institution-wide strategic initiatives. IT goals should be aligned with NPS key initiatives and goals. The strategic plan should be followed by a number of operational plans that can provide blueprint-level outlines for action in the short and medium term. All plans should have concomitant resource plans, which are updated and presented to NPS leadership at appropriate times for review.
39. An annual report on IT operations should be made to NPS leadership and to all internal NPS constituencies. Report should include:
  - Measurement of progress on plan.
  - Achievement of milestones.
  - Identification of potential obstacles to next stage of implementation.
  - Update on budget and expenditures.
  - Update on IT information from peer institutions.
  - Information about emerging technologies that will affect NPS.
  - Information about customer satisfaction with IT services.
40. Institutionalize faculty, student, and staff input and guidance to IT-related issues through standing committees. The IT Strategic Planning Task Force can serve as the over-arching university-wide advisory body on IT matters. Subgroups addressing administrative systems, the network, and academic IT services

## IT MANAGEMENT AND RESOURCES

IN ORDER TO FULFILL ITS ROLE AS A MISSION CRITICAL RESOURCE, IT MUST OFFER SERVICE AT THE HIGHEST LEVEL OF EXCELLENCE. TO DO SO, THE IT DIVISION SHOULD BE MANAGED WITH THE HIGHEST DEGREE OF ACCOUNTABILITY AND RESPONSIVENESS TO INSTITUTIONAL GOALS.

should be established and charged with a formal advisory role. Departmental representation is essential and participation a priority.

41. Include an IT review of all proposals for institutional funding to realize economies of scale and that technology investments are consistent with support and maintenance policies (e.g. POM review process).

42. Encourage partnerships between IT and other NPS departments in order to leverage opportunities and resources (e.g. library, advancement, multi-media services, distance learning, etc.).

43. Evaluate customer service through regular surveys.

44. Seek out partnerships and consortial arrangements with peer institutions to better leverage IT investments, benefit from experience of other institutions, and become visible national IT leaders.

45. In order to ensure efficient IT planning, formally include IT requirements planning in any and all plans for renovations or new construction at NPS.

46. Undertake a benchmarking study as soon as possible to determine a peer group of institutions and similar IT operations that can be used as a baseline to compare planning processes, staffing levels, use of new technologies, and resources.

47. In order to ensure alignment of IT plans with academic goals, ask individual colleges and institutes to include IT needs and priorities in their annual reports to the provost.

## HUMAN RESOURCES

The functioning of any IT organization is directly proportional to the talent and skill levels of the staff. As a result, the recruitment and retention of talented staff must be one of the highest priorities.

IT is defined by change and innovation – staff supporting IT at a research university must be highly skilled, and interested in engaging in high-level work with sophisticated customers. They also must be involved in ongoing programs of professional development. In addition, staff should participate in national organizations of IT professionals in order to engage in the leading issues in IT and to make contacts with colleagues at other institutions. Those contacts can provide important benchmarking information, advice about lessons learned, best practices, etc.

Some of the most talented IT staff left in the last seven years to take more lucrative positions in Silicon Valley. Those who remained at NPS have not attended many continuing education programs, conferences, vendor-sponsored certifications, or other programs providing IT training or instruction. Technical expertise must be developed in the organization and that expertise must be maintained through continuous education programs structured by IT leadership. These professional development opportunities will be powerful recruitment and retention strategies. Other recruitment and retention strategies should be explored, including higher pay scales for mission-critical positions, incentive pay, merit-based pay, etc.



The Campus Computing Project's latest report, Campus Computing 2001, shows the results of the 12th annual survey of computing and information technology in U.S. higher education. Two of the five most urgent strategic issues facing IT involved human resources. One priority issue was providing for the professional development of IT personnel and the other issue had to do with the challenges of retaining IT personnel. Even with the recent economic downturn, it is estimated that "almost half of the new IT jobs will remain vacant...because of a lack of applicants with the requisite technical and non-technical skills" (Information Technology Association of America, [www.ita.org](http://www.ita.org)).

Investing in human resources is the most important element in the management of IT. In order to accommodate current and projected needs in all three major areas of IT service (administrative, academic, and infrastructure), a number of human resource initiatives should be considered.

#### Recommendations

48. The need to increase the number of IT staff members is documented in the FY 2003 FA study. Areas requiring additional support include network engineering, administrative systems, and academic services for research and instruction. Specific suggestions for staff ramp-up are made in the IT Resource Summary.

49. Recruitment and retention of the most talented IT professionals should be a high NPS priority. A plan for recruitment should be developed immediately. This plan should include an organizational structure that is consistent with the best IT organizations at peer universities. Career paths and compensation levels should be developed as well.

50. A program of professional development should be established in order to ensure core competencies are developed and maintained. In addition, opportunities for continuing education should be made available. These will serve as important recruitment and retention benefits.

51. The entire IT organization should be reviewed from a Human Resource perspective. Each professional IT position should have a concomitant title and career path.

52. Compensation levels for IT professionals should be reviewed for market competitiveness. Incentive and merit-based pay are possibilities to consider.

## CUSTOMER FOCUS

Customer orientation is a difficult priority when resources are diminished and expectations increase. Staff members are busy with crisis management and have little or no time for collecting information about customer needs, priorities, or satisfaction. Unfortunately, this creates a cycle of dissatisfied customers, and staff are unable to turn the tide. The cycle then leads to an "us versus them" orientation that is not constructive. Sufficient resources must be provided to rebuild customer trust and relationships. Leadership must direct the required change in culture.

## IT MANAGEMENT AND RESOURCES

THE CAMPUS  
COMPUTING  
PROJECT'S LATEST  
REPORT SHOWS THE  
RESULTS OF THE 12<sup>TH</sup>  
ANNUAL SURVEY OF  
COMPUTING AND  
INFORMATION  
TECHNOLOGY IN U.S.  
HIGHER EDUCATION.  
TWO OF THE FIVE  
MOST URGENT  
STRATEGIC ISSUES  
FACING IT INVOLVED  
HUMAN RESOURCES.

STAFF MEMBERS ARE BUSY WITH CRISIS MANAGEMENT AND HAVE LITTLE OR NO TIME FOR COLLECTING INFORMATION ABOUT CUSTOMER NEEDS, PRIORITIES, OR SATISFACTION. UNFORTUNATELY, THIS CREATES A CYCLE OF DISSATISFIED CUSTOMERS, AND STAFF ARE UNABLE TO TURN THE TIDE.

The following recommendations address customer service:

#### Recommendations

53. The culture of the IT organization should reflect a customer orientation. Customers should be defined by two general categories: (1) U.S. Navy and (2) NPS internal constituent groups. Customer opinions and advice should be sought regularly. A variety of approaches might be employed:

- Formal committees.
- Informal but regular meetings with constituent representatives.
- Ensure alignment with Navy directions (system changes).
- Seek corporate partnerships to:
  - Tap industry opinion about future technology directions.
  - Get assistance for IT issues.
  - Collaborate on demonstration projects important for Navy objectives.
  - Enlist support for key IT initiatives at NPS.

54. Since IT involves time-sensitive skill sets, it is equally important that the central IT organization help in developing a program of workshops, training classes, seminars and online resources for the larger NPS community. This effort should be coordinated with Human Resources.

### IT RESOURCE REQUIREMENTS

The Information Technology Strategic Plan recommends significant investment in Naval Postgraduate School IT operations in order to provide technological support for mission critical functions of research and instruction and service to the Navy and the Department of Defense. Historically underfunded, the central IT operation is currently unable to meet the rising expectations of NPS constituents: faculty, students, and staff. In order to bring NPS IT to a level comparable with peer institutions and to participate in national IT leadership initiatives (e.g. Internet2), a substantial increase in IT support is required.

A recent series of site visits provided comparative data to illustrate this point. The following is a summary of central IT resources per faculty member (in the case of SPAWAR, Pt. Loma, 1/3 of the staff total was used as a comparable figure for faculty total):

UCSC.....	\$33,750	UCSD .....	\$25,000
Cal Tech.....	\$32,600	Claremont Grad. Univ. ....	\$20,769
SPAWAR .....	\$25,000	Naval Postgrad. School .....	\$10,000

Three models of IT support are presented for consideration:

#### MODEL 1: Status Quo

##### *Costs*

##### *Financial*

Operating budget	\$600,000
Labor budget	\$3,500,000
Annual central IT budget	\$4,100,000

## Other

Little ability to implement IT Strategic Plan. Concerns about IT largely not addressed. Issues about IT continue to increase. Realization of academic quality undermined. Morale diminished. Academic aspirations lowered.

## Benefits

Maintain low resource requirement for central IT division.

## MODEL 2: Beginning the Transformation

### Costs

#### Financial

#### Six-year IT Resource Unfunded Request Summary (in \$000s)

	FY04	FY05	FY06	FY07	FY08	FY09
Personnel	1,400	1,700	2,100	2,400	2,700	3,000
Non-Personnel	2,775	1,450	1,670	1,300	2,250	1,800
Total	4,175	3,150	3,770	3,700	4,950	4,800

Two areas of investment are recommended: human and financial resources:

#### 1. Human resources:

- 15 staff by June 2004 (12 technical, 3 non-technical).
- 15 staff by June 2007 (12 technical, 3 non-technical).

Includes enhanced network support, Internet2, wireless environment, video element of voice and data network, security enhancement, communication and outreach, administrative system replacement/upgrade.

#### 2. Financial resources:

- One-time infrastructure and administrative system costs:
  - In-ground wiring replacement (conduit at capacity, currently experiencing root and asphalt compression in places) (life cycle estimate = 20 years).
  - Router/switch replacement on national standard replacement cycle (every 3-4 years).
  - Development of video capability on voice and data network.
  - Administrative systems replacement/upgrade - installation or development of system integration, interfaces, and enhanced executive reporting.
- Ongoing required non-staff resources:
  - Additional annual by June 2003.
  - Additional annual by June 2007.

#### Includes:

- Expansion of internet connectivity.
- Annual security audit, crisis response team.
- Improvement of faculty, staff, and student satisfaction with IT services.
- Communication and outreach.
- Support of Internet2 initiative.

HISTORICALLY  
UNDER-FUNDED,  
THE CENTRAL IT  
OPERATION IS  
CURRENTLY UNABLE  
TO MEET THE RISING  
EXPECTATIONS OF  
NPS CONSTITUENTS.  
IN ORDER TO BRING  
NPS IT TO A LEVEL  
COMPARABLE WITH  
PEER INSTITUTIONS  
AND TO PARTICIPATE  
IN NATIONAL IT  
LEADERSHIP INITIA-  
TIVES, A SUBSTANTIAL  
INCREASE IN IT  
SUPPORT IS  
REQUIRED.

PROGRESS TOWARD  
THESE GOALS WILL BE  
ACCELERATED AND  
SUBSTANTIAL  
ACCOMPLISHMENT  
WILL ALSO BE SEEN  
IN THE FOLLOWING:  
VISUALIZATION  
SUPPORT, LIBRARY  
KNOWLEDGE PORTAL,  
HIGH PERFORMANCE  
COMPUTING, VIDEO  
NETWORK  
CAPABILITY AND  
DISTANCE LEARNING  
SUPPORT.

- Mapping of infrastructure, network monitoring software.
- Training.
- Instructional design teams to support IT and multimedia use in instruction and distance education.
- Routine acquisition and replacement of IT equipment and software for instructional purposes.
- Implementation of first stages of NPS Portal architecture for administrative applications and services.
- Development of wireless campus.
- Implementation of management, governance, and other policies and processes per higher education IT standards and best practices.
- Increased recognition by media and stakeholders of IT excellence at NPS.

### MODEL 3: Accelerating the Transformation

#### *Costs*

##### *Financial*

#### Six-year IT Resource Unfunded Request Summary (in \$000s)

	FY04	FY05	FY06	FY07	FY08	FY09
Personnel	1,400	3,100	4,900	5,200	5,400	5,800
Non-Personnel	2,975	1,650	1,870	1,700	2,550	2,200
Total	4,375	4,750	6,770	6,900	7,950	8,000

Two areas of investment are recommended: human and financial resources:

#### 1. Human resources:

- 15 staff by June 2004 (12 technical, 3 non-technical).
- 15 staff by June 2005 (12 technical, 3 non-technical).
- 15 staff by June 2006 (12 technical, 3 non-technical).
- 15 staff by June 2007 (12 technical, 3 non-technical).

Includes support for enhanced network support, Internet2, wireless environment, video element of voice and data network, security enhancement, communication and outreach, and administrative system replacement/upgrade.

Progress toward above goals will be accelerated and substantial accomplishment will also be seen in the following: visualization support, library knowledge portal, high performance computing, video network capability and distance learning support.

#### 2. Financial resources:

- One-time infrastructure and administrative system costs:
  - In-ground wiring replacement (conduit at capacity, currently experiencing root and asphalt compression in places)(life cycle estimate = 20 years).
  - Router/switch replacement on national standard replacement cycle (every 3-4 years).
  - Development of video capability on voice and data network.
  - Administrative systems replacement/upgrade - installation or development of system integration, interfaces, and enhanced executive reporting.

- Ongoing required non-staff resources:
  - Additional annual by June 2003.
  - Additional annual by June 2007.

Includes:

- Expansion of internet connectivity.
- Annual security audit, crisis response team.
- Communication and outreach.
- Support of Internet2 initiative.
- Mapping of infrastructure, network monitoring software.
- Training.
- Instructional design teams to support IT and multimedia use in instruction and distance education.
- Routine acquisition and replacement of IT equipment and software for instructional purposes.
- Implementation of first stages of NPS Portal architecture for administrative applications and services.
- Development of wireless campus.
- Implementation of management, governance, and other policies and processes per higher education IT standards and best practices.

Assumes substantial acceleration toward achievement of the above milestones. Also provides for significant progress toward high-end network support for Internet2 participants and academic applications in specific departments: astronautics/aeronautics, electrical and computer engineering, computer science, meteorology, oceanography, mechanical engineering.

Expect the following performance measures to be realized:

- Widespread acknowledgement of NPS as technological leader on the central coast.
- Significant improvement in results of IT satisfaction surveys of NPS faculty, students, and staff.
- Active engagement in video network roll-out.
- NPS contributes regularly to local area access television channels.
- NPS contributes to the national Research Channel.
- NPS produces annual video of IT-related highlights.
- Demonstrated improvements in NPS network reliability, speed, and capacity.
- Frequent media coverage of research and instruction innovations.
- Frequent presentations by NPS IT staff in professional association conferences, workshops, seminars, etc.
- Featuring of NPS leadership in publications highlighting IT leadership: Military Technology, EDUCAUSE, SCUP.
- NPS leadership invited to do keynote addresses at IT-related conferences: Sun Microsystems Education and Research Conference, Cisco Summit, IBM Higher Education Leadership Conference, etc.
- NPS becomes the Network Operations Center for the Monterey Peninsula I-Net.
- Monterey Peninsula secures a regional GigaPop site.

## COMMUNICATION

Since IT is a strategic institutional priority, communication about IT matters must be frequent, timely and accessible to all members of the NPS community. In addition, external communications about IT events and news should be part of the IT communications strategy, and an integral part of the larger advancement strategic plan for NPS. IT-related communications should be managed by the central IT office in order to ensure most efficient and accurate dissemination of information. The following recommendations focus on improvement of IT communications.

### Recommendations

55. Increase the frequency and expand the modalities of communications about NPS IT. All means of communication will be explored for appropriate use: electronic, existing committee structures, web capabilities, video, face-to-face meetings and presentations, leadership speeches and presentations, publications, program agendas for important campus visitors, NPS reports, etc. Regular opportunities for effective communication within NPS and with NPS friends and stakeholders off-campus about IT will be identified and coordinated with Institutional Advancement.

56. Communicate IT commitment to consultation, information-sharing, and reflective practice, in order to better support collaboration and effective decision-making.

57. Include IT Services in larger NPS advancement efforts. Since IT itself is a mode of communication as well as a strategic resource priority within the institution, IT services will be part of larger advancement efforts. For example, website development will be defined as a priority for both IT and advancement.

58. Develop a publication describing IT services at NPS.

59. An important element of a communication and outreach approach is training. IT is an invaluable institutional resource, but it requires a commitment to training in order to fully maximize its potential. As a result, NPS will develop an IT training program for campus constituencies.

- Content will be determined through consultation with campus constituencies.
- Mode of delivery will include a mix of different types of learning modalities. For example, delivery options will include asynchronous learning opportunities, hands-on, in-class opportunities, electronic tutorials, workshops, etc.
- Training will be coordinated centrally and be responsive to the needs of individual schools, departments, institutes, programs, and administrative units.
- Training will be coordinated with Human Resources in order



to ensure links with institution-wide policies and with other training opportunities.

## PARTNERSHIP AND OUTREACH

In order to leverage institutional resources most effectively, NPS must forge partnerships with peer institutions, IT companies, and local communities. Partnerships and alliances permit applying a multiplier to the IT activities and resources at NPS, increasing the political and economic influence of NPS, and raising visibility about NPS IT in general. Toward this end, the following recommendations are proposed.

### Recommendations

60. Coordinate IT-related corporate vendor relations within central IT services. Relationships with companies should be developed that go beyond transaction-based contracts. Longer term multi-dimensional relationships will be explored. NPS leadership will be involved in initiating contacts with leaders of partner companies. Benefits include:

- Continuity of service over a longer time.
- Investment in NPS academic mission.
- Higher volume transactions resulting in lower costs.
- Additional voices to promote and advocate for NPS priorities.

61. Establish consortial relationships with local Department of Defense organizations to coordinate IT training for IT professional staff. A number of local organizations have expressed interest in this kind of cooperative effort, that can result in lowered costs and access to higher level professional development opportunities.

62. Establish consortial relationships to access high speed networks within the state. Fleet Numerical Meteorology and Oceanography Center, CSU-Monterey Bay, and Monterey Bay Aquarium Research Institute (MBARI) have expressed interest in such arrangements. Lowered costs for access to higher speed and capacity networks than NPS could afford individually can result.

63. Make outreach to local communities a part of the central IT agenda. Participation in local and regional networks (e.g. I-Net) can leverage NPS IT investments and provide increased visibility for the NPS mission.

64. Identify budget shortfalls each year so that opportunities to extend programmed budget with research related resources are possible.

COMMUNICATION  
ABOUT IT MATTERS  
MUST BE FREQUENT,  
TIMELY AND  
ACCESSIBLE TO ALL  
MEMBERS OF THE NPS  
COMMUNITY. IN  
ADDITION, EXTERNAL  
COMMUNICATIONS  
ABOUT IT EVENTS  
AND NEWS SHOULD  
BE PART OF THE IT  
COMMUNICATIONS  
STRATEGY, AND AN  
INTEGRAL PART OF  
THE LARGER  
ADVANCEMENT  
STRATEGIC PLAN  
FOR NPS.

# CONCLUSION

## URGENCY TO CHANGE

Information Technology is a strategic institutional resource, and has an impact on every dimension of the Naval Postgraduate School mission. Research, education, and service to the Navy and the Department of Defense are all affected by the currency, reliability, and support of Information Technology.

The central IT division has an important responsibility to provide the tools and services necessary to support NPS mission, and should be resourced to fulfill this responsibility. NPS leadership has asked for an IT Strategic Plan that will provide for a way to realize that responsibility. The urgency for change is voiced by every constituency at NPS because of the very nature of the change that is required. No class is taught without IT, no research is performed without IT, and no administrative system is managed without IT.

NPS must move now from a perspective that Information Technology is limited in importance to defining Information Technology as virtually limitless in its application. Rather than seeing IT as a series of problems about which faculty, students and staff voice concerns, NPS must see IT as a trigger for profound institutional change.

## THE NPS IT STRATEGIC PLAN

The changes recommended for IT operations at NPS in this report are substantial, and must be accomplished over time. The optimal way of making the necessary changes is through a systematic planning process that is reviewed and evaluated on an annual basis. Goals and objectives have been identified and implementation strategies for each of the major IT areas have been defined – all focused on improving IT operations and services in a way that is consistent with overall NPS mission.

It must be underscored that incremental improvements will be made over time, but jump-starting a new institutional perspective will take a public, visible, and consistent refocusing of priorities and resources.

## IMPLEMENTATION AND ACCOUNTABILITY

Implementation will begin October 1, 2002 and will end September 30, 2007. Annual reports on progress will be shared with the NPS leadership and the entire NPS community. These will include action plans for the coming year, updated based on emerging trends and technologies, ongoing consultation and advisement by the IT Task Force, and possible new, unforeseen opportunities. Annual action plans will include updated costing estimates and implementation timelines.

## OUTCOMES

The vision for IT at NPS is to enable NPS to realize its goal to become one of the top research universities in the U.S. by the year 2020. This environment will have a centrally coordinated IT service organization that provides high-level support for research and instruction as its core mission.

The NPS IT environment will be characterized by:

- **INNOVATION** – Provide support for faculty and student leadership in the testing and demonstration of emerging technologies. Recognition that IT excellence is rooted in a commitment to change, innovation, experimentation, and imagination.
- **TALENT** - Enable leading-edge research by support for sophisticated communications and computing. This means highly skilled technical support for visualization, streaming video, instructional multimedia applications, security testing and evaluation, wireless landscapes, high performance computing, etc. Access to talented, knowledgeable technical staff, who participate in ongoing professional development programs and engage in national professional associations to maintain skill currency and contacts with colleagues at peer institutions.
- **ACCESS TO ADVANCED TOOLS** – Ubiquitous access to state of the art communications infrastructure that integrates voice, video, and data capabilities that is renewed and upgraded at regular cycles. Access to current technology in equipment and software.
- **COMMITMENT TO SERVICE** – Dedication to serving faculty, students, and staff that is visible through degree of effort, courtesy of interactions, regular seeking of constituent advice and input, and routine assessments of how well service is being provided.
- **INTEGRATED, EFFICIENT ADMINISTRATIVE SYSTEMS** – Enable administrative leaders to develop, maintain, and upgrade administrative systems that maximize institutional effectiveness and efficiency. Working with administrative leaders to provide systems that are characterized by single point data entry, internal consistency and integration, flexibility, relational database structure, useful management reporting systems, and customer orientation.
- **LEADERSHIP** – Provide leadership of IT services through strategic planning, informing the university of emerging technological directions and opportunities, managing and leading institutional change, annual reporting to the community about IT operations and services, development of partnerships and alliances with other institutions and agencies to maximize technological currency and minimize costs, and to make an articulate, persuasive case for IT resources on a regular basis.

## RECOMMENDATIONS FOR FUTURE WORK

This IT Strategic Plan articulates needed initiatives, actions and resources to execute critical NPS responsibilities. It further provides a repeatable process for annual review of NPS needs and priorities.

Recommended areas of future development include:

- Measurement of progress and problems in execution.
- Establishing a connection between the Strategic Plan and budgeting process.
- Conducting further strategic planning on how a “Net-Centric NPS” approach might better engage and integrate NPS capabilities into Navy and Defense operations.

THIS IT STRATEGIC  
PLAN ARTICULATES  
NEEDED INITIATIVES,  
ACTIONS AND  
RESOURCES TO  
EXECUTE CRITICAL  
NPS RESPONSIBILI-  
TIES. IT FURTHER  
PROVIDES A  
REPEATABLE PROCESS  
FOR ANNUAL  
REVIEW OF NPS  
NEEDS AND  
PRIORITIES.



## INFORMATION TECHNOLOGY STRATEGIC PLANNING TASK FORCE

Chris Arias ..... Student Services  
 Alex Bordetsky ..... Information Sciences  
 Doug Brinkley ..... Business  
 Don Brutzman ..... Faculty Council  
 Christine Cermak ..... Chief Information Officer  
 Glenn Cook ..... Information Sciences  
 Lisa Curtin ..... Dean of Students  
 Vince Darago ..... Office of Continuous Learning  
 Dean Ebert ..... Student Council  
 Douglas Fouts ..... Electrical and Computer Engineering  
 Jack Gallagher ..... Financial Planning

Lillian Gassie ..... Library  
 Tom Halwachs ..... Chief Technology Officer  
 Tracy Hammond ..... Registrar  
 Stephen Hurst ..... Defense Resource Management Institute  
 Alan Jones ..... IT Department  
 Shu Liao ..... Business  
 Beny Neta ..... Mathematics  
 Rudy Panholzer ..... Space Systems  
 Megan Reilly ..... Chief Financial Officer  
 Joe Roth ..... Student Council





# NAVAL POSTGRADUATE SCHOOL